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Engineered Plume Collapse - A Comprehensive Approach for Accelerating Vadose Zone and Ground Water Cleanup at the Lawrence Livermore National Laboratory Livermore Site.

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The Environmental Restoration Division at Lawrence Livermore National Laboratory (LLNL) is currently implementing an aggressive environmental cleanup strategy known as Engineered Plume Collapse (EPC) at the LLNL Livermore Site, in Livermore, California. EPC is an integrated, multi-disciplinary remediation strategy designed to reduce the cost of site cleanup by applying the lowest cost technologies appropriately to different parts of the contaminated ground water plumes**.** EPC defines a separate cleanup strategy for the distal portions of the plumes versus the source areas. The distal plumes contain dissolved phase volatile organic compounds (VOCs) that are mostly contained within coarse-grained sediments that are well suited to ground water extraction technologies, as is supported by Livermore Site data. Source areas contain high concentrations of VOCs with significant mass, located in fine-grained, low-permeability sediments, that slowly leach into the coarser-grained sediments. Source areas have historically been very difficult to remediate.

The goal of this strategy is to rapidly clean up the distal and mid-range portions of the over thirty distinct individual ground water contaminant plumes, thereby "collapsing" the plumes back to their source areas. The source areas are hydraulically controlled by a relatively small number of strategically placed pumping wells. As distal plume extraction wells are shut down, budgets and resources can be reallocated to focus on source area remediation. At the source areas, other technologies will be applied to remediate VOCs remaining in high concentrations in the fine-grained materials. These technologies may include electro-osmosis, hydrous pyrolysis oxidation, vapor extraction, or other innovative technologies that become available. By implementing an aggressive cleanup strategy, EPC rapidly reduces the concentration of contaminants in the plumes, thereby increasing the likelihood of early site closure.

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